AIChE

The Catalyst

PITTSBURGH CHAPTER
AMERICAN INSTITUTE OF CHEMICAL ENGINEERS

Volume 20 Issue 6 **February, 2006**

www.aichepgh.org

FEBRUARY MEETING NOTICE

ANNUAL STUDENT NIGHT

Topic: ***Nanotechnology-based Materials and Devices for Biochemical Sensing***

Where: William Pitt Student Union
University of Pittsburgh – Oakland Campus
Pittsburgh, PA 15260

When: Monday, February 13, 2006

Time:

5:45PM	**Registration**
6:00	**Reception and Student Poster Session**
6:45	**Dinner**
7:45	**Presentation by Dr. Hong Koo Kim**

Menu: Please select one of the entrees below. All meals include Green Beans Amandine, Herb-Roasted Red Potatoes and dessert of Burnt Almond Torte.

- ***Rosemary Roasted Chicken*** *– Oven-roasted and seasoned with fresh rosemary in a Madiera wine sauce.*
- ***Sesame Seared Tuna with Ginger and Plum Broth*** *– Delicate tuna steak seared with an Asian flair.*
- ***London Broil with Mushroom Sherry Sauce*** *– Tender marinated flank steak, thinly sliced and topped with mushroom in Sherry sauce.*

Cost: $22.00 Members
$20.00 Students and unemployed members
$27.00 Non-members

RSVP NO LATER THAN
MONDAY FEBRUARY 6, 2006

TO: Mr. Gary Hall, Vice-Chair
Phone: 412-963-0303, ext. 236
E-mail: gary.hall@sauereisen.com

Your RSVP must include: **Name, Company Name, Menu Choice Email Address, and Phone Number.**

PLEASE PAY AT DOOR

CANCELLATIONS: If you must cancel your meeting reservation, please do so no later than 48 hours prior to the meeting. Otherwise, you will be invoiced for the cost of your meal.

~About the Presentation~

Dr. Hong Koo Kim is Professor of Electrical and Computer Engineering and Co-Director of the Institute of NanoScience and Engineering at the University of Pittsburgh. The Institute of NanoScience and Engineering comprises over 35 faculty members from the Schools of Engineering, Arts and Sciences, and Health Sciences. The Institute's vision is to solve large, complex scientific and engineering challenges in the nanotechnology area by facilitating interdisciplinary teams. Dr. Kim's research in the nanotechnology area investigates plasmonics as an enabling technology for *nanosystems-on-a-chip* that offer multifunctionality in the optical, electrical, chemical and biological domains.

The ability to characterize, manipulate and organize matter at nanoscale offers tremendous opportunities for the creation and utilization of new materials, devices and systems that will greatly benefit society. In this talk, Dr. Hong Koo Kim will give an overview of the nanotechnology research that is being conducted at the Institute of NanoScience and Engineering, University of Pittsburgh. His presentation will focus on the materials, devices and instrumentations research intended for diagnostic applications in advanced healthcare. Below is a brief illustration of sample projects in this category.

A hierarchical assembly process has been developed to create crystalline colloidal arrays of nanoscale and mesoscale colloidal particles. Monodispersed particles and composite of particles are synthesized and are combined with hydrogel matrices to form materials with nanoscale periodicities, whose transmission and diffraction properties can be controlled by binding of particular chemical species. These materials are being developed into bio-chemical sensors, such as noninvasive monitoring of glucose levels.

A directed self-assembly process has been developed to form ordered nanopore arrays on macroscale (chip to wafer scale) area of foreign substrates. The nanostructured wafers are being investigated as a host or template for variety of nanodevices useful for biomedicine, such as separation and

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LETTER FROM THE CHAIR

Dear Members,

Thanks to all of you who attended the ***"Federal Energy Policy and YOU"*** seminar and to the speakers: Dr. Gerst Gibbon (retired, DOE), Mr. Michael Eastman (DOE) and Mr. Ed Cummins (Westinghouse Electric). Also, thanks go to all those who attended January's joint meeting at Penn Brewery with the Air & Waste Management Association and to Dr. Joel Tarr for presenting a history of water, air and land pollution in the Pittsburgh region.

February 13th is our annual **Student Night** at the William Pitt Union on the University of Pittsburgh (Oakland campus). Undergraduate and graduate students will have the opportunity to present posters about their research projects. The evening is also one of the first chances students have to interact with our Section. I highly encourage all members to attend.

Do you want to celebrate **National Engineers Week**? If yes, please volunteer to make superballs at the Carnegie Science Center on February 17th and 18th.

Are you currently looking to make a career move? If yes, I encourage you to attend the ***"Job Searching for Chemical Professionals"*** seminar on February 24th at Duquesne University. We are co-sponsoring this event with the Society for Analytical Chemists, the American Chemical Society, and On Assignment Lab Support.

Do you want to show your pride in being a member of the Pittsburgh Section of AIChE? If you do, buy an embroidered denim long-sleeved shirt at an upcoming meeting. Men's shirts are $23 and women's shirts are $21.

David Missenda
AIChE Pittsburgh – Section Chair

MONTHLY MEETING

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absorbent media, catalytic surface and supports and high-density sensor/probe arrays. Nano-optic technologies are being investigated to develop chip-scale spectroscopic tools, shrinking table-top instrument to a nail-tip size and yet offering multifunctionality. The enabling technology is based on the plasmonic phenomena occurring in metallic nanostructures and is expected to allow for highly parallel quantification of multiple analytes in a low-cost and low-sample volume format, important for point-of-care applications.

At Annual Student Night, your Pittsburgh Section will be hosting students from the Carnegie Mellon University, the University of Pittsburgh, Youngstown State University, and West Virginia University. Please attend this worthwhile event! This is an excellent opportunity for students to experience a professional society meeting and for our members to encourage students' future enrollment and participation in AIChE as young professionals.

Meeting Location and Parking Information:

The William Pitt Student Union is located on the University of Pittsburgh campus in Oakland, at the corner of Bigelow Blvd. and Fifth Avenue. The Student Union is directly across from the Cathedral of Learning on the Bigelow Blvd. side.

Parking is available in the garage at the Soldiers and Sailors Memorial across from the Student Union on the Fifth Avenue side.

For an interactive campus map, visit *www.umc.pitt.edu/tour/tour-firstmap.html.*

Driving directions to the Oakland Campus of the University of Pittsburgh may be found at *www.umc.pitt.edu/tour/directions.html.*

MEMBERSHIP CORNER

We are constantly updating our local membership database. Please send all change of address notifications to the Membership Chair:

Holly Gray
Michael Baker Jr., Inc.
Airside Business Park
100 Airside Drive
Moon Township, PA 15108
hgray@mbakercorp.com

If you have not already done so, please verify your updated e-mail address with us so that you will continue to receive monthly newsletters! Thank you.

Please sign me up for the local Pittsburgh Section of AIChE

Name _____

Company _____

Address _____

City _____ State _____ Zip _____

Business Phone _____

Residence Phone _____

Email _____

Annual Dues are $16.00. Make check payable to "AIChE Pittsburgh Section" and send to the Treasurer:

Leigh Anne Wacker
AIChE Treasurer
337 Quail Run Road
Venetia, PA 15367

NEWSLETTER DEADLINE

THE DEADLINE FOR THE MARCH NEWSLETTER IS FRIDAY, FEBRUARY 24, 2006

Please submit information to:

E.G. Klein
Goldschmidt Industrial Chemical Corp.
941 Robinson Highway
McDonald, PA 15057
724-796-3128
eg.klein@giccusa.com

AICHE NATIONAL NEWS

EWeek
Celebrate National Engineers Week, February 19-25, 2006 and celebrate the world of difference engineers make to our quality of life. "E-Week" is a fun and informative way to reach out and raise awareness in the fields of engineering, math, science, and technology. Programs include "Girl Day" on February 23, a worldwide effort to encourage young women and girls to consider a career in engineering. Or show kids how math can unlock the mysteries of science with creative science projects from Super Cyberspace Science. To learn more about scheduled E-Week events and activities and how to get involved, please visit *www.aiche.org/eweek.aspx*

Short Courses for Chemical Engineers - For a complete list of upcoming short courses, dates, locations, and registration information, visit: *www.asme.org/education/shortco/shortcourses.htm* (Note: Chemical engineering courses start with the letters "CH")

Easy Dues It
Log on to the newly redesigned *www.aiche.org* to pay your dues online. It's quick and easy. Log in and select "update my membership" from the home page or visit the Member Center.

That's One Big Meeting! Save the Date for Spring
This spring, the 2006 AIChE Spring National Meeting, Global Congress on Process Safety—with CCPS International Conference, Loss Prevention Symposium, Process Plant Safety Symposium--plus World Congress on Particle Technology will all be held at Disney's Dolphin Hotel, Orlando, Florida, April 23-27. For details, visit:
www.aiche.org/Conferences/SpringMeeting/index.aspx

ENGINEERING VOLUNTEERS

Have you ever had a desire to "give back" to your profession, to become more involved with your Pittsburgh Section, or to help mentor today's youth? Then why not become involved by volunteering an hour or two of your time by helping our Section sponsor a ***Superball Making*** table at the Carnegie Science Center for National Engineers Week. Please join us on February 17th and 18th as a volunteer for this event! Contact Nancy Hirko at *nhirko@air-comp.com* or phone 412-826-3636 for more information.

SPONSORSHIPS

Interested in placing your company's information in future AIChE Newsletters?

Full Page	$300
Half Page	$175
Quarter Page	$95
Business Card Size	$45
1/12 Page	$30

Place multiple sponsorships and receive a discount!
Three consecutive ads – 10% off
Eight consecutive ads – 30% off

Contact E.G. Klein at eg.klein@giccusa.com or 724-796-3128 for more information.

2006-2007 PITTSBURGH SECTION EXECUTIVE COMMITTEE NOMINATIONS

Are you interested in volunteering and in becoming more involved in your Pittsburgh Section? Then, you might want to become a member of our Executive Committee. By volunteering to be part of this Committee or as one of the additional officers and chairs, you will be giving back to your profession and you will be helping others. To nominate someone or yourself (why not?), please contact the Past Chair, Dr. Jim Schneider at 412-268-4394 or by e-mail to s*chneider@cmu.edu*.

THANKS FOR VOLUNTEERING!

The Pittsburgh Section members below who volunteered for the 2006 Pittsburgh Regional Future City Competition at Carnegie Music Hall in Oakland deserve a round of applause! Thank you for helping the middle school children in the Pittsburgh region! After months of hard work, participating children presented their projects on Saturday, January 21, 2006.

Mike Friedrich

Carl Schwartz

(l to r) Chris Steffy, JoAnn Truchan, Shelley Zhang, David Missenda

Not pictured: Eric Boonstra, Bill Stenger, Dick Dupree, Janet Vukotich & Joseph Barry

AIChE Pittsburgh Award winners from Keystone Oaks School
(l to r) Teacher Nadine Pisani, Trevor Decker, Zach Hoey, Kathryn Jones and mentor Thomas Hoey

JOB SEARCHING FOR CHEMICAL PROFESSIONALS

Presented by

The Society for Analytical Chemists of Pittsburgh
The American Chemical Society, Pittsburgh Section
The Spectroscopy Society of Pittsburgh

Friday, February 24, 2006

Duquesne Room, Student Union
Duquesne University, Pittsburgh

Fee: $10.00 (Lunch and Parking in the Forbes Avenue Garage included)

PROGRAM:

9:00 AM	Registration
9:25	Welcome and Introduction
9:30	***Managing an Effective Job Search*** Dr. Ray O'Donnell Coordinator of Graduate Studies, SUNY-Oswego
10:40	BREAK
10:50	Managing an Effective Job Search (cont'd)
12:00 PM	LUNCH
12:50	Presentation by Dana Schliebner, Senior Staffing Consultant at On Assignment
1:00	***Opportunities with the FBI*** by James J. Knight, FBI Applicant Coordinator
1:30	Resume Review and Personal Consultation
3:30	Concluding Remarks

Please bring your resume in order to participate in the afternoon program

For additional information, contact Lyle Farr at 724-837-1741 or elfarr@earthlink.net

Registration:

Please make $10.00 check payable to *ACS Pittsburgh Section* and mail with completed registration form by February 17, 2006 to:

Dr. T. J. Weismann, 321 Mellon Hall,
Duquesne University, PA 15282

_____**Full Day** _____**Morning Session** *(Lunch included)*

Name: _____

Address: _____

City: _____ ***State***_____ ***Zip***_____

Phone: _____

E-mail address: _____

STUDENT NIGHT RESEARCH ABSTRACTS

Synthesis and Evaluation of Peptide Hydrogels for Enhancing Endothelial Cell Adhesion and Proliferation

By Alex Gedra (& others), a junior ChemE student at YSU, who worked at University of Cincinnati as a summer REU intern.

Abstract

Q11 (Ac-QQKFQFQFEQQ-Am), a peptide designed and proven to self assemble into ß-sheet based hydrogels was synthesized along with other variants, Q11-IKVAV (Ac-GGIKVAVGGGQQKFQFQFEQQ-Am) and Q11-RGDS (Ac-GGRGDSGGGQQKFQFQFEQ Q-Am). These peptides were made into hydrogels and mixed at various concentrations. Purity and mixture consistency were to be ensured using HPLC and mass spectroscopy. These gels were then to be tested for cytotoxicity with human umbilical vein endothelial cells (HUVEC) and also tested for cell proliferation. This was done to show possible application of self assembling peptides as a synthetic basement membrane for synthetic blood vessels. In particular small vessels (< 8 mm) like those used in coronary artery bypass surgery.

Recyclability of Flame Retardant Polycarbonate: Comparison of Non-halogenated to Halogenated Flame Retardant

By David Statler Jr. (& others), a ChemE student at WVU.

Abstract

A recyclability study was performed on a halogenated (brominated) and a non-halogenated (potassium diphenylsulfone sulfonate) flame retarded polycarbonate. A recycling process consisting of an oven, extruder, pelletizer, oven, injection molder, and granulator, was used to process the material. Limiting oxygen index and UL94 type tests are reported. Mechanical results were assessed by IZOD impact and tension tests. Thermogravimetric analysis and capillary rheometry were also performed. Results show that the non-halogenated flame retardant polycarbonate holds up just as well as the halogenated flame retardant polycarbonate. Potassium diphenylsulfone sulfonate would potentially make a good replacement for the halogenated flame retardant.

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Anode Blends for the Direct-Carbon Fuel Cell

By Jennifer Kosker (& other), a ChemE student at WVU.

Abstract

The fuel cell as a means of generating electricity has become a popular source of study recently, due to its simplicity and high efficiency. The so-called Direct-Carbon Fuel Cell (DCFC) uses the oxidation of carbon:

$$C + O_2 \rightarrow CO_2$$

as opposed to the conventional reaction producing water from hydrogen and oxygen, because of the greater efficiencies

possible. In the DCFC, a carbon rod acts as both fuel and the anode. The rod must (1) be relatively cheap, (2) have a low sulfur content (to avoid corrosion of the fuel cell material), (3) have a low ash content (to avoid contaminating the electrolyte), and (4) have a high electrical conductivity (or low electrical resistivity). In this work, we tested blends of two different sources for sulfur content, ash content and electrical resistivity.

Cenfuel and Petroleum Coke were the two sources used. Rods were constructed with varying amounts of these two materials, plus approximately 15% binder pitch to hold the solids together. The optimum blend was found to depend upon the property tested. The lowest amount of sulfur was contained in a blend of 25% petroleum coke; the lowest ash in 100% petroleum coke; the lowest resistivities in blends of 20-25% petroleum coke. Clearly the optimum composition will depend upon the economics of all of these parameters.

Impact of PEGylation on the Stability and Bioprocessing of Proteins

By Kenneth Hu, a senior ChemE student at CMU.

Abstract

Hydrophobic surfaces, used in reverse phase chromatography (RPC), often denature the target proteins. PEGylation, the covalent attachment of PEG chains to proteins, may both provide a hydrophobic tag for purification and may stabilize proteins against denaturation. We have analyzed the thermal stability of ribonuclease A and apo-a-lactalbumin with zero, one, or two attached 20kDa PEG chains using circular dichroism (CD) and have correlated the free energies of unfolding with observed RPC separation behavior. While the PEG portion of the conjugates dominates the RPC retention behavior, we found that PEGylation offers little protection against thermal denaturation.

REU Research: Stress Tolerance of Escherichia Coli in 3-Hydroxypropanoic Acid

By Tirzah Mills (& others), a ChemE student at WVU.

Abstract

This study summarizes the effort to identify genes of *Escherichia coli* that confer tolerance to 3-hydroxy-propanoic acid (3-HP). 3-HP is a building block chemical that has the potential to become a renewable alternative to petrochemicals through biorefining. Metabolic pathways of recombinant *E. coli* have been discovered that can produce 3-HP at low titers, but preliminary findings indicate that increased titers of 3-HP significantly inhibit cell growth. In general, organic acids enter the cell and then dissociate. The resultant protons increase internal pH, while the anions react in various metabolic pathways. For this project, genomic libraries were constructed using the pEZSeq vector and growth curves were used to analyze tolerance levels. Increases in specific growth rate were observed for all selected clones grown in 10 g/L 3-HP, buffered to pH 7 in minimal media. Plasmid DNA sequencing revealed multiple genes that contributed to stress tolerance. When media was enriched with amino acids, clones expressed a shortened lag phase. Growth curve results for media supplemented with amino acids provide support for the mechanism of pH_i maintenance via amino-acid decarboxylation. The genes identified through this work can be integrated into future *E. coli* strains to be used for the viable industrial production of 3-HP.

DETROIT 02.05.06

Go STEELERS!

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2006 Monthly Meeting Schedule

Date	Topic	Location
February 13, 2006	Annual Student Night	University of Pittsburgh - Oakland
March, 2006	Technical Presentation	TBA
April 11, 2006	Corporate Culture & Managing Change	Jimmy G's – Sharpsburg, PA
May, 2006	Last Meeting of the Year	TBA

Mark your Calendars!

For the Following Dates:

February 13, 2006	Annual Student Night	University of Pittsburgh - Oakland
February 17–18, 2006	Outreach Event	National Engineer's Week – Carnegie Science Center – North Side
February 24, 2006	Managing a Job Search	Duquesne University - Pittsburgh
April 11, 2006	Monthly Meeting	Jimmy G's – Sharpsburg, PA
May 2, 2006	Pittsburgh Chemical Day	Hilton Hotel, Pittsburgh

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